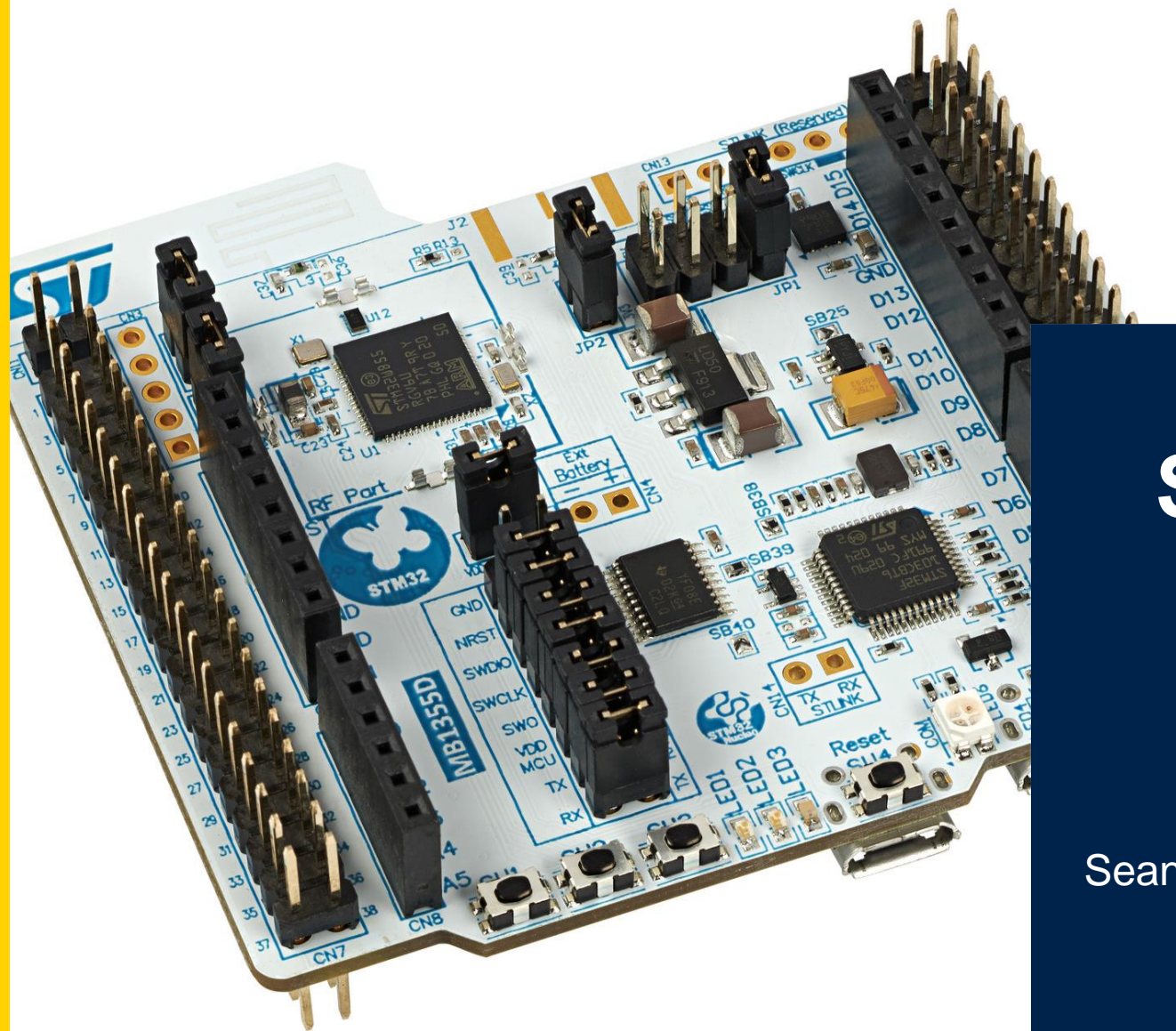




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# STM32WB를 이용한 제품 개발 시작 안내서 BLE & ZigBee & Thread

Sean Park

# Agenda

# STM32WB development environment

# How to study STM32WB

# STM32WB information collection

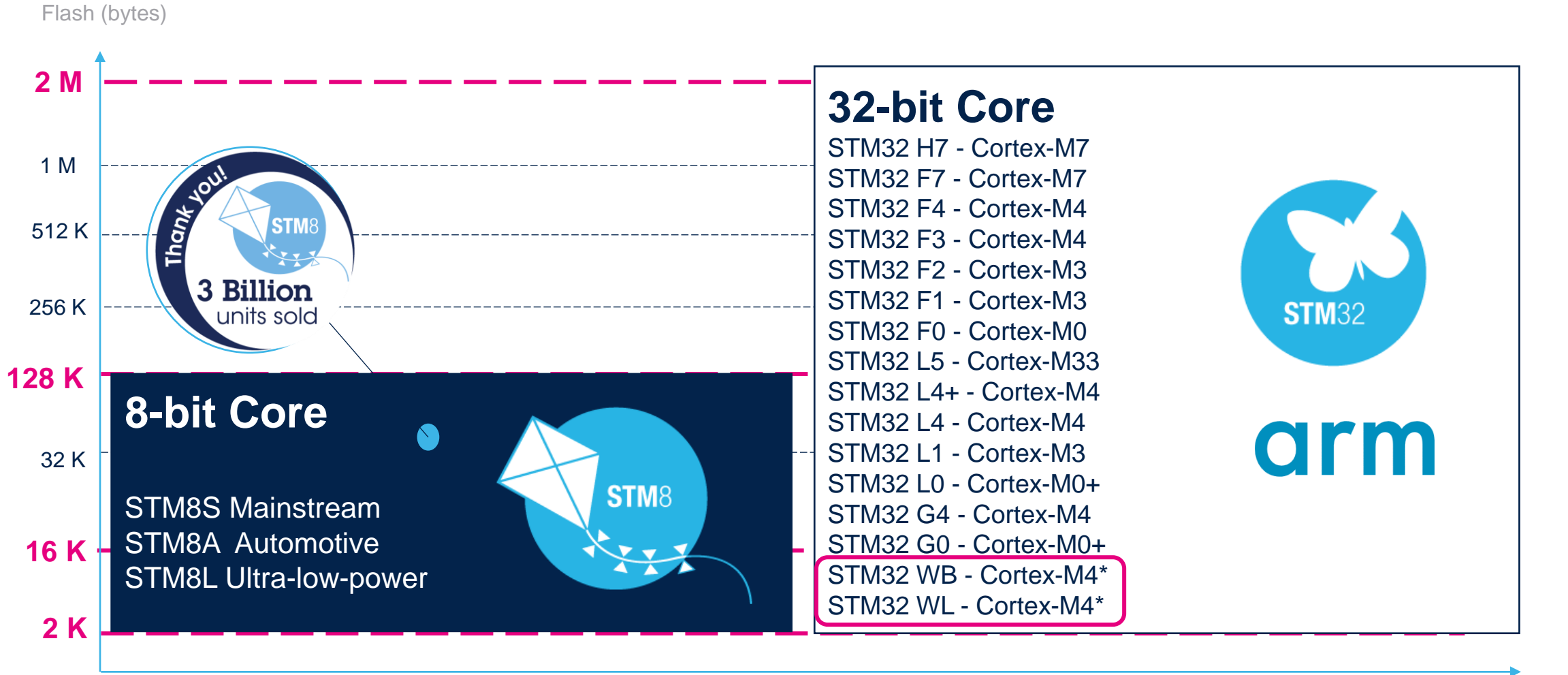
# QnA

# STM32WB development environment

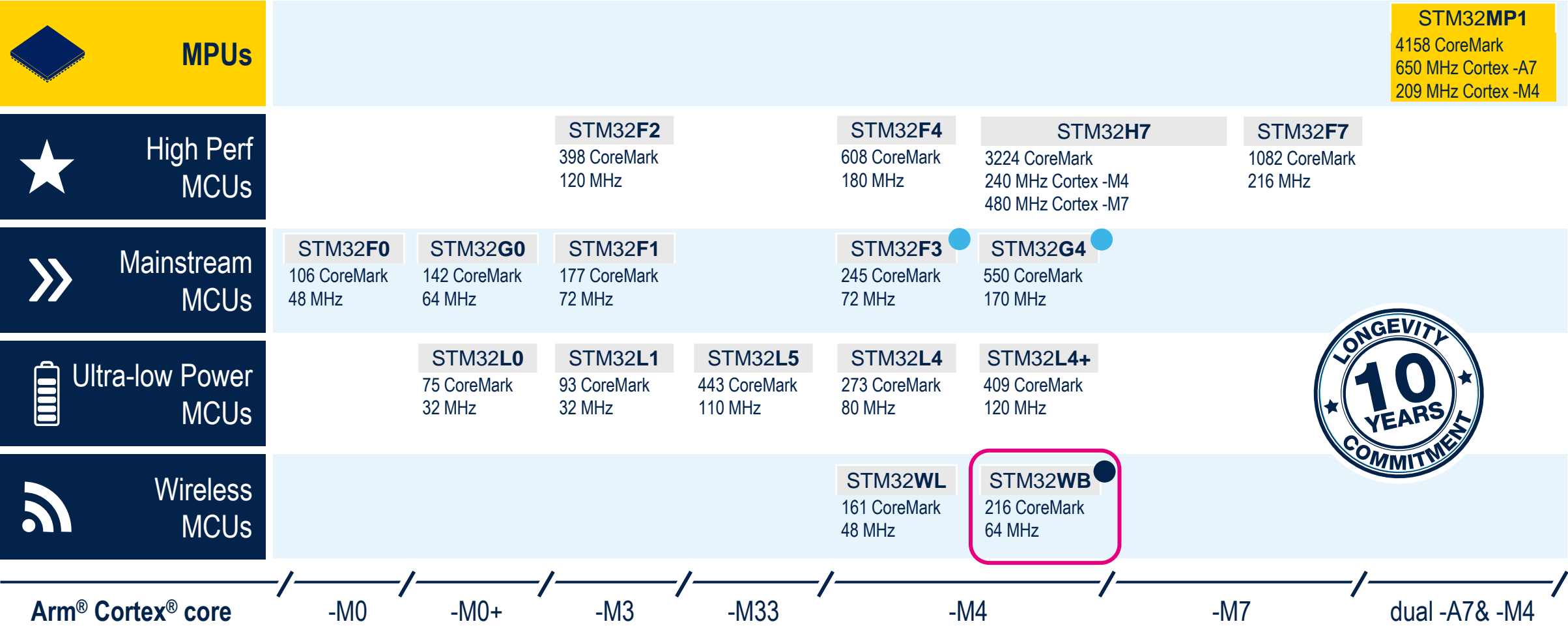


# MCUs portfolio TODAY

## new families development focus

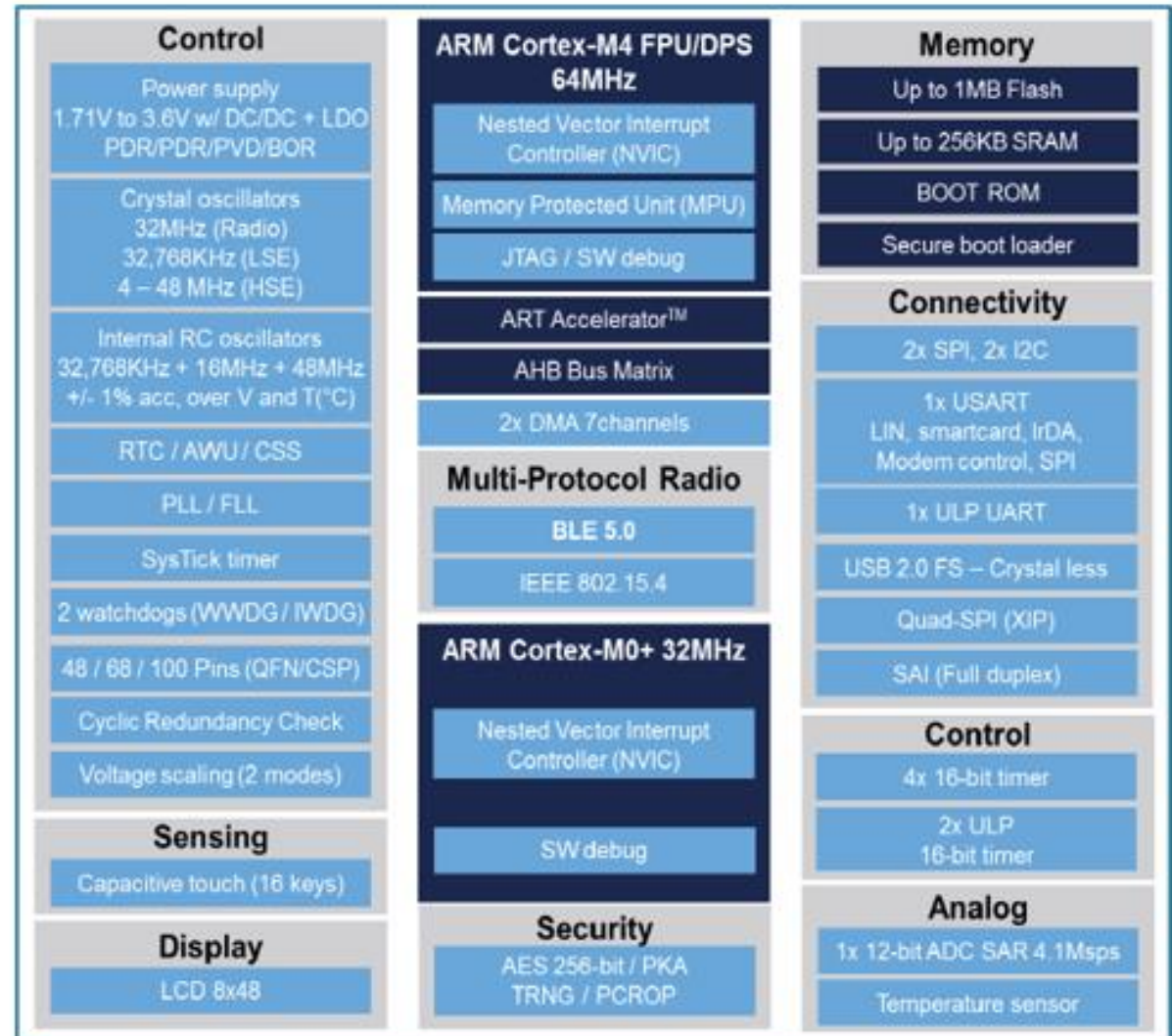


# STM32 MCUs and MPUs portfolio



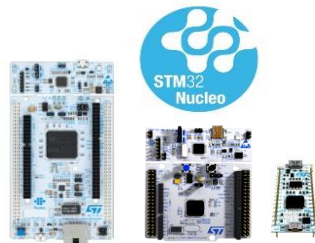
# STM32WB55 Block Diagram

- 3 autonomous sub-systems:
  - Cortex-M4
  - Cortex-M0+
  - Radio sub-system
- Voltage range (SMPS, LDO):  
1.71 V to 3.6 V
- Temperature range:  
-40°C to +105°C
- Packages:  
QFN48, QFN68, WLCSP100



# Hardware development tools

## Development Tools adapted to your needs



STM32 Nucleo

Flexible prototyping

[www.st.com/stm32nucleo](http://www.st.com/stm32nucleo)



Discovery kits

Key feature prototyping

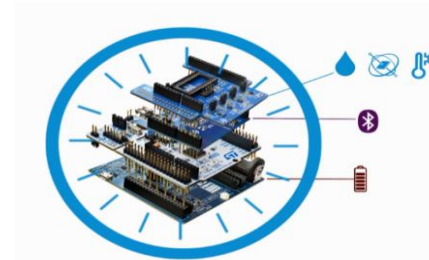
[www.st.com/stm32discovery](http://www.st.com/stm32discovery)



Evaluation boards

Full feature evaluation

[www.st.com/stm32evaltools](http://www.st.com/stm32evaltools)



STM32 Nucleo expansion

Functionality add-on

[www.st.com/x-nucleo](http://www.st.com/x-nucleo)

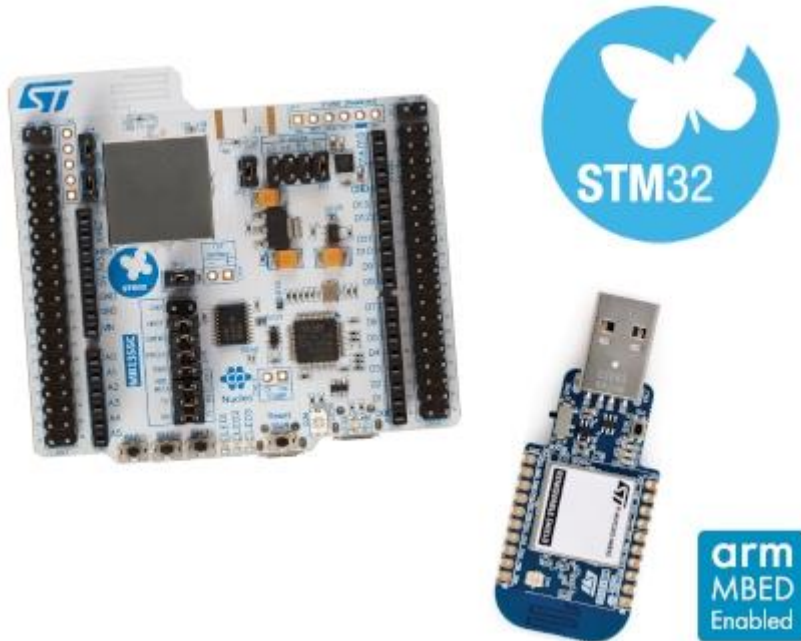


Third-party boards

From full evaluation to open hardware

# STM32WB dev kit bundle

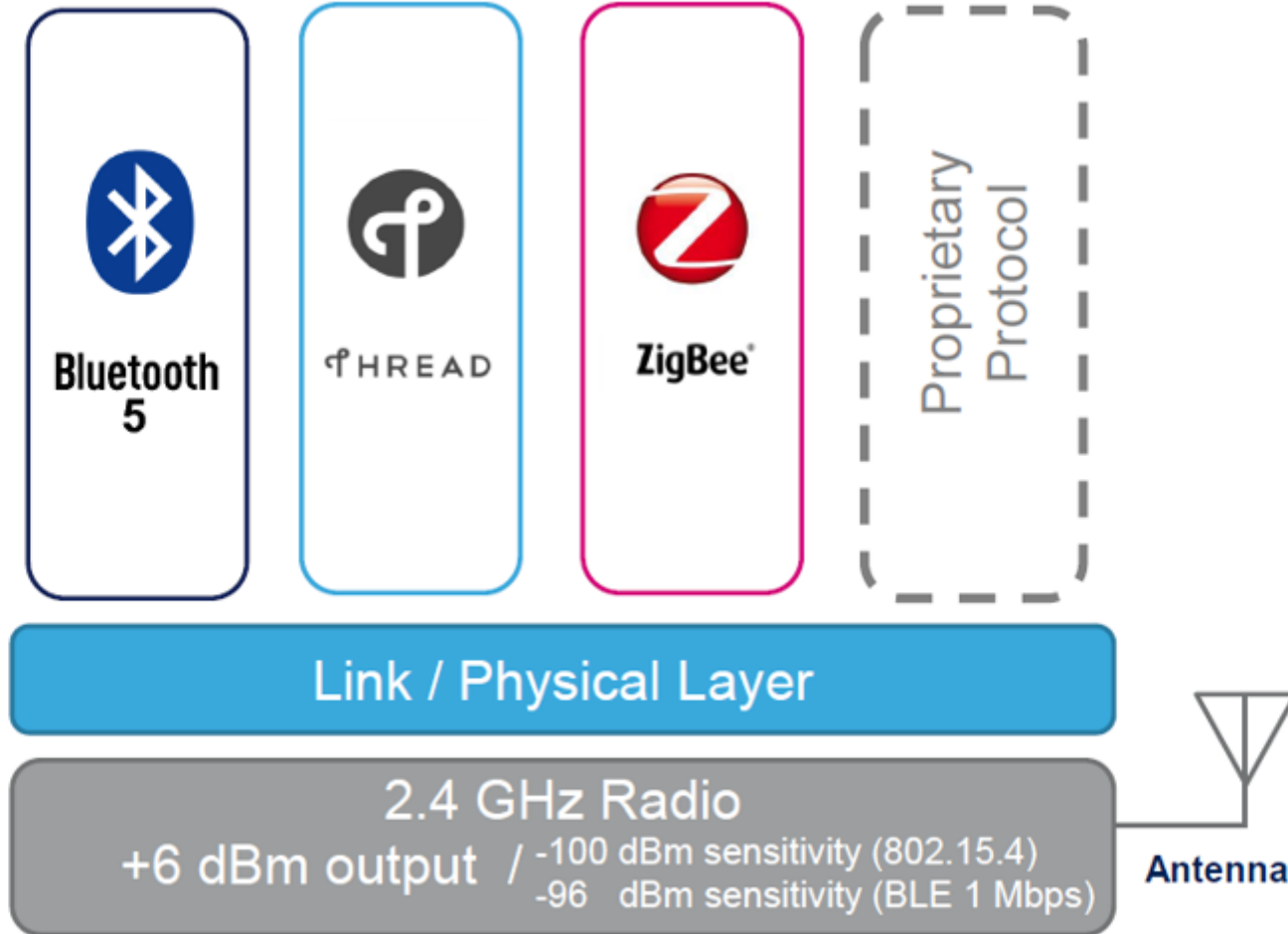
- P-NUCLEO-WB55



## KEY FEATURES

- Nucleo68
  - STM32WB microcontroller in a VFQFPN68 package
  - 2.4 GHz RF transceiver supporting Bluetooth® specification v5.0 and IEEE 802.15.4-2011 PHY and MAC
  - Dedicated Arm® 32-bit Cortex® M0+ CPU for real-time Radio layer
  - Three user LEDs
  - Three user buttons and one reset button
  - Board connector: USB user with Micro-B
  - Board expansion connectors:
    - Arduino™ Uno V3
    - ST morpho
  - Integrated PCB antenna or footprint for SMA connector
  - Flexible power-supply options: ST-LINK USB VBUS or external sources
  - On-board socket for CR2032 battery
  - On-board ST-LINK/V2-1 debugger/programmer with USB re-enumeration capability: mass storage, virtual COM port and debug port
  - Comprehensive free software libraries and examples available with the STM32Cube Expansion Package
  - Support of a wide choice of Integrated Development Environments (IDEs), including IAR™, Keil®, GCC-based IDEs, Arm® Mbed™
- USB dongle
  - STM32WB microcontroller in UFQFPN48 package
  - 2.4 GHz RF transceiver supporting Bluetooth® specification v5.0 and IEEE 802.15.4-2011 PHY and MAC
  - Dedicated Arm® 32-bit Cortex® M0+ CPU for real-time Radio layer
  - Switch for boot management
  - User push button
  - Three user LEDs
  - Integrated PCB antenna or UFL connector

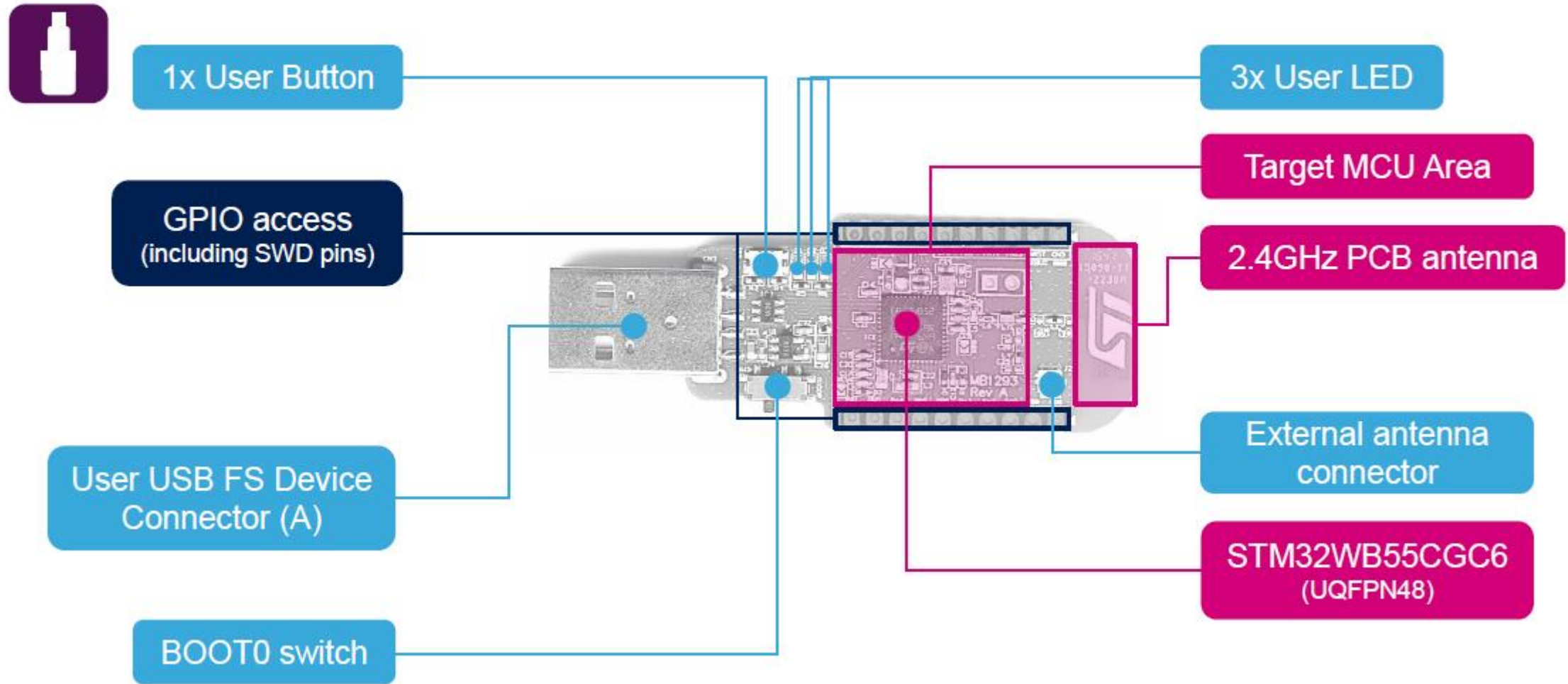
# Wireless part – make it Yours



# STM32WB dev kit bundle



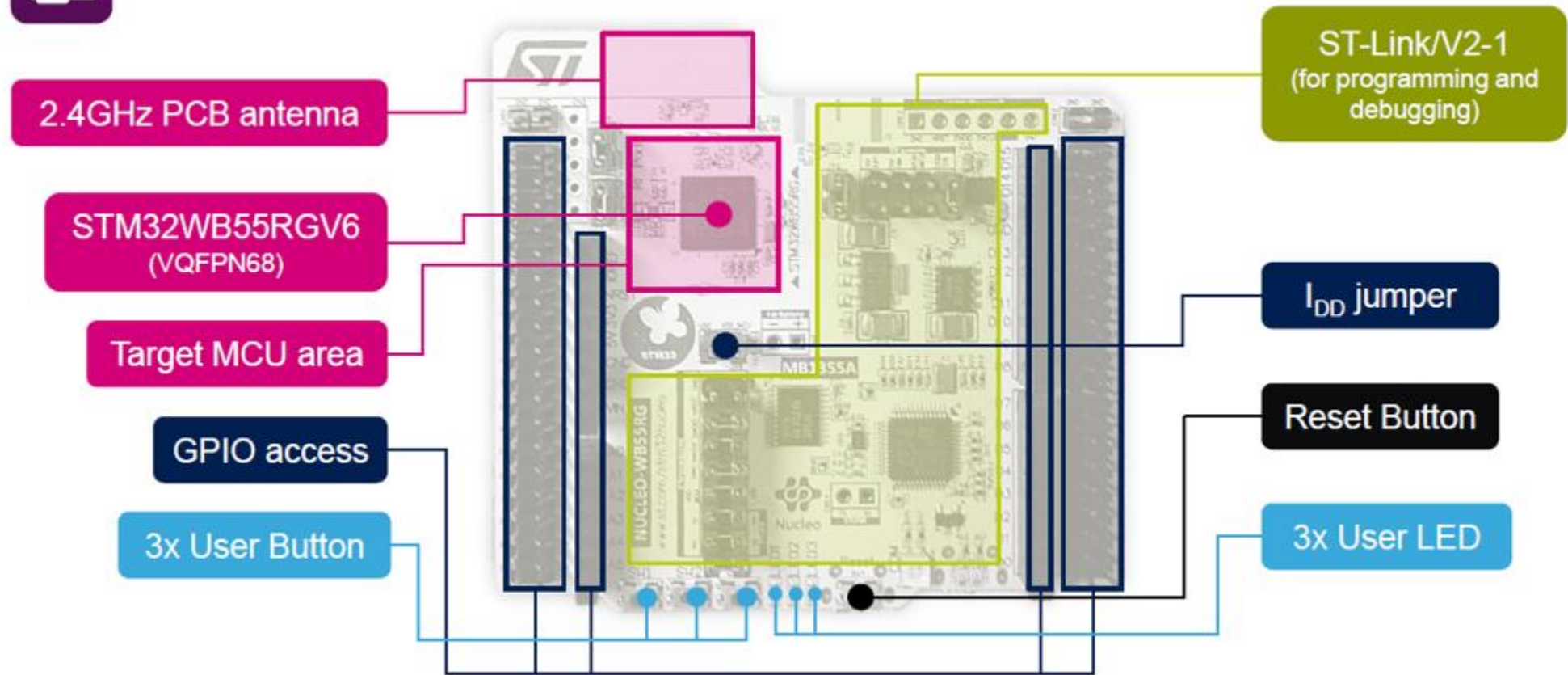
# STM32WB USB dongle



# STM32WB Nucleo Kit



## TOP SIDE

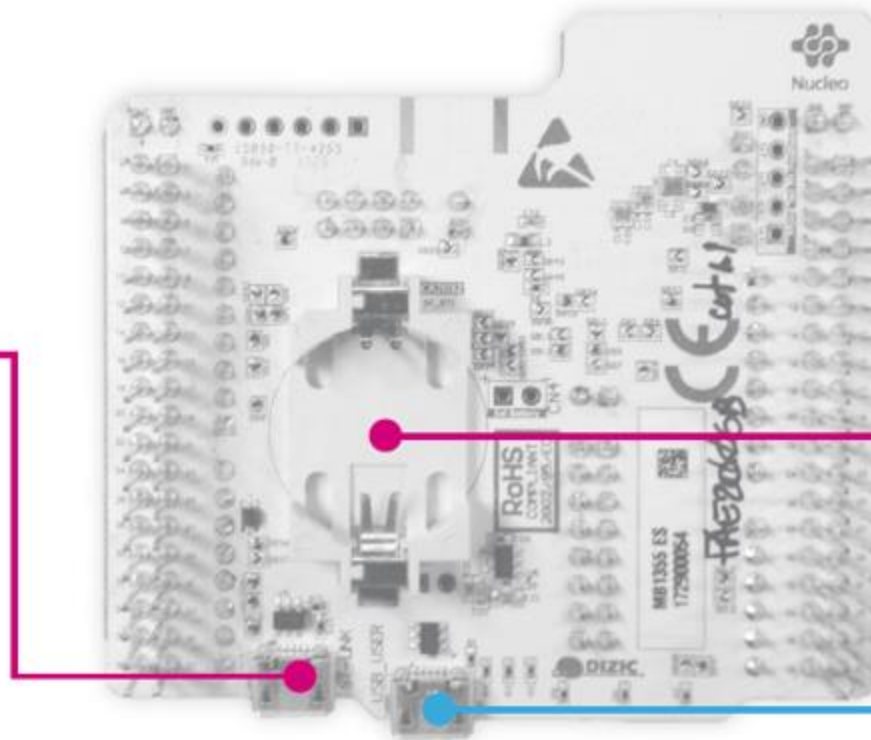


# STM32WB Nucleo Kit

BOTTOM SIDE



ST-Link USB  
Connector (micro)



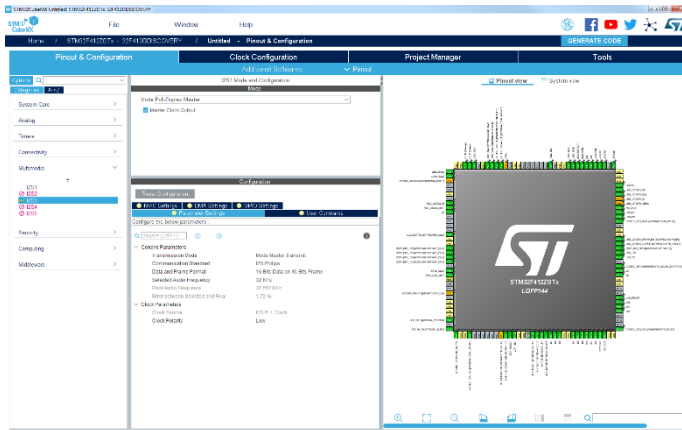
CR2032 socket

User USB FS Device  
connector (micro)

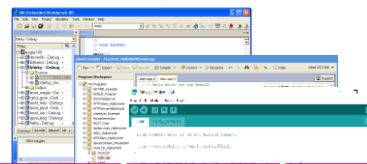
# STM32 software tools portfolio

A C/C++ flow in three steps

STM32  
CubeMX



FREE  
IDES



STM32  
CubeIDE



STM32  
CubeMonitor



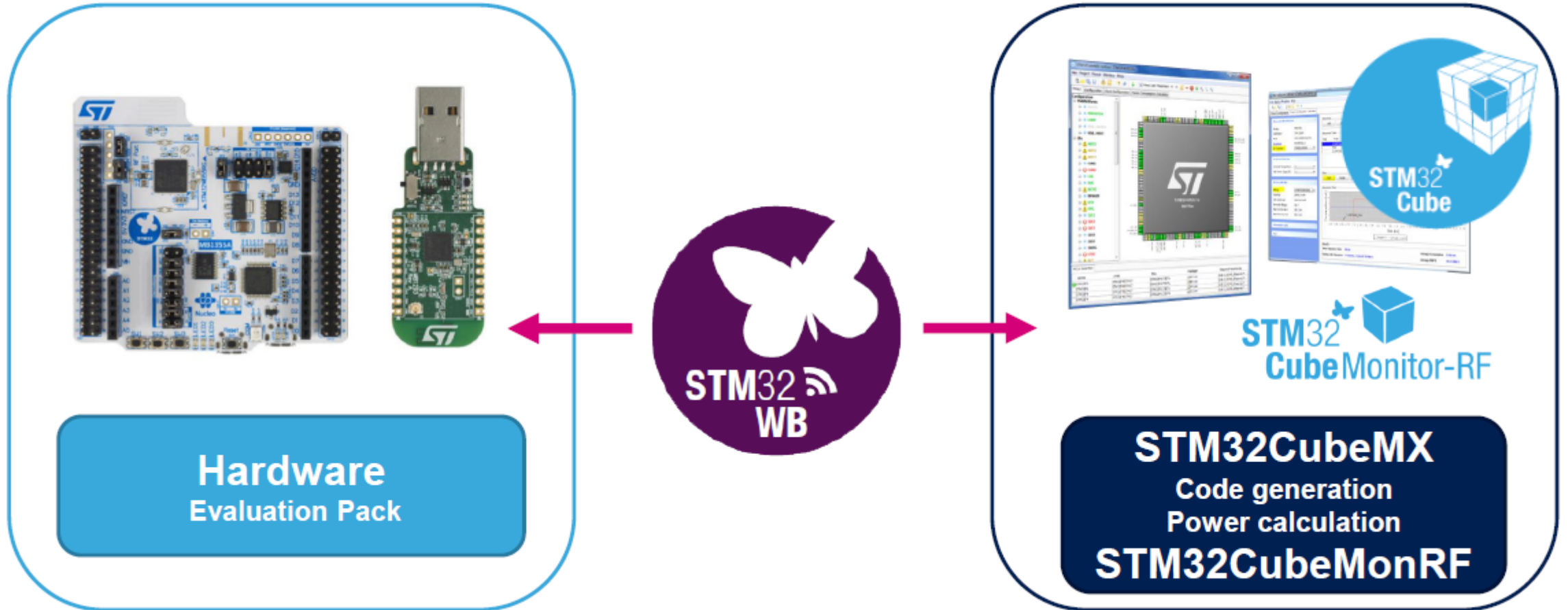
STM32  
CubeProgrammer

STM32CubeMX, GUI Builders  
Configure & Generate Code

ST and Partner IDEs  
Compile and Debug

STM32CubeProg/Monitor  
Monitor, Program & Utilities

# Prototyping made as easy as 1,2,3



# STM32WB Study

**S T U D Y**



# How to study STM32WB?

- STM32WB Workshop MOOC ( Massive Open Online Course )

STM32WB Firmware Update Over the Air (FUOTA)
STM32WB Networking – BLE MESH
STM32WB RF guidelines
STM32WB workshop



**STM32 goes wireless: BLE IoT for all!**

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

[Access the course](#)



**STM32 goes wireless: BLE IoT for all!**

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

[Access the course](#)

# How to study STM32WB?

- STM32 Online Training (OLT)

▼ STM32 Online Training
STM32G4 Online Training
STM32F7 Online Training
STM32L4 Online Training
STM32L4+ Online Training
STM32G0 Online Training
STM32WB Online Training
STM32H7 Online Training
STM32MP1 Online Training
STM32L5 Online Training

### STM32 Online Training (OLT)

STM32L5 online training (OLT) STM32MP1 Online Training (OLT) STM32H7 online training (OLT) STM32G4 Online Training (OLT)

STMicroelectronics STMicroelectronics STMicroelectronics STMicroelectronics

모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기

### STM32 Online Training (OLT)

STM32WB Online Training (OLT) STM32F7 online training (OLT) STM32G0 Online training (OLT) STM32L4 Online Training (OLT)

STMicroelectronics STMicroelectronics STMicroelectronics STMicroelectronics

모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기

# How to study STM32WB?

- STM32 Online Training (OLT)

The image shows a YouTube video player interface. The main video area displays a slide titled "Training session organization" with a list of topics: Introduction, System, Memory, Security & Safety, Analog, Communication & Peripherals, Watchdogs & Timers, Ecosystem, and Next steps. A circular logo with a butterfly and the text "STM32 WB" is visible on the left. The right sidebar shows a playlist titled "STM32WB Online Training (OLT)" with 5 videos. The first video is highlighted.

YouTube SG

검색

Training session organization 2

Introduction

System

Memory

Security & Safety

Analog

Communication & Peripherals

Watchdogs & Timers

Ecosystem

Next steps

STM32 WB

STM32WB Online Training (OLT)

STMicroelectronics - 1 / 50

STM32WB OLT - 1. Introduction Welcome session 3:30 STMicroelectronics

2 STM32WB OLT - 2. Introduction Series Presentation 3:14 STMicroelectronics

3 STM32WB OLT - 3. System ARM Cortex M4 1:53 STMicroelectronics





4 STM32WB OLT - 4. System ARM Cortex M0+ CM0 4:58 STMicroelectronics

STM32WB OLT - 5. System

# How to study STM32WB?

- STM32 Wireless Solutions (Short Range, Long Range, Positioning)

STM32 Wireless Solutions (Short Range, Long Range, Positioning)

			
DEMOS - STM32 Wireless solutions - short range	STM32 Wireless Solutions - Long Range	STM32WB Positioning	STM32WB Video Series Getting Started Part 1 - Overview
STMicroelectronics	STMicroelectronics	STMicroelectronics	STMicroelectronics
모든 재생목록 보기	모든 재생목록 보기	모든 재생목록 보기	모든 재생목록 보기



STM32WB Video Series  
Getting Started Part 1 - Overview

0:01 / 3:08

STM32WB Getting Started Series  
STMicroelectronics - 1 / 13

- 1 STM32WB Getting Started Series: Part 1, Overview (3:09)
- 2 STM32WB Getting Started Series: Part 2, Navigating ST.com (8:00)
- 3 STM32WB Getting Started Series: Part 3, Tools Install (9:13)
- 4 STM32WB Getting Started Series: Part 4, CubeWB (8:41)

# ST Learning Home

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Partner Program  
**Learning Home**  
Video Center  
ST Community

**ST Developers Conference**  
is going virtual on October 20-21

Register to experience virtual demos and technical seminars from ST and our partners

Join us →

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**Meet ST**  
Our broad product portfolio based on the most recent technologies addresses a wide range of applications

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Use our intuitive, comprehensive eDesignSuite software suite to find products and solutions that match your application needs

**Tools & Software**  
Find tools and software to help reduce development time, effort and cost

**Community & Training**  
Connect with the ST community, find training material or check out our videos

# STM32WB Learning

The screenshot shows the STMicroelectronics website's Learning page. The top navigation bar includes the ST logo, a search bar, and links for Products, Applications, Solutions, Tools & Software, About ST, Sample & Buy, Support & Community, and Login. The left sidebar menu is expanded to show the Learning section, with sub-items like Recorded Webinars, Partner trainings, STM32 Education, Text Books, STM32 MOOCs (Massive Open Online Courses), MCU Training Courses, STM32 Online Training, STM32 Embedded Security Learning Journey, Newsletters, ST25 Education, and Open-Source Education Curricula. The main content area is titled 'Learning' and contains sections for 'Learn more about our products and how to use them', 'Seminars & Training', 'Videos & e-Presentations', and 'Newsletters'. A blue 'Feedback' button is visible on the right side of the page.

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Support Home

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Partner trainings

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MCU Training Courses

STM32 Online Training

STM32 Embedded Security Learning Journey

Newsletters

ST25 Education

Open-Source Education Curricula

## Learning

Learn more about our products and how to use them

### Seminars & Training

ST organizes seminars and training courses on our products, either hosted directly by ST or in partnership with third parties. You can browse our [seminar and training calendar](#).

### Videos & e-Presentations

A [complete list](#) of our short videos and animated presentations that can explain how the main features of so of our key products, and how they can help you in your application design.

### Newsletters

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# STM32 MOOCs (Massive Open Online Courses)

Products Applications Solutions Tools & Software About ST Sample & Buy Support & Community Login

Products Search... Search Contact Us English

STM32L4 workshop	<a href="#">cryptography</a> duration: 2h00	<a href="#">STM32CubeIDE basics</a> duration: few hours	<a href="#">duration: 3h00</a>	<a href="#">Motor Control Part 4</a> duration: 1h00	<a href="#">security features</a> duration: 5h00
STM32MP1 workshop		<a href="#">TouchGFX how to</a> duration: 0h25	<a href="#">STM32WB workshop MOOC</a> duration: 5h00	<a href="#">Motor Control Part 5</a> duration: 4h00	<a href="#">Security Part 4 - STM32 security in practice</a> duration: 4h00
<b>STM32WB Firmware Update Over the Air (FUOTA)</b>		<a href="#">STM32 Graphics workshop</a> duration: 5h00	<a href="#">STM32MP1 workshop</a> duration: 5h00	<a href="#">STM32 USB training</a> duration: 10h00	<a href="#">STM32WB RF guidelines</a>
STM32WB Networking – BLE MESH		<a href="#">STM32Cube.AI workshop</a> duration: 2h00	<a href="#">STM32L5 - what really matters with Ultra Low Power</a> duration: 0h40	<a href="#">STM32WB BLE MESH introduction</a> duration: 1h00	<a href="#">STM32 Security tips</a> duration: 0h30
STM32WB RF guidelines				<a href="#">STM32WB Firmware Update Over the Air (FUOTA)</a> duration: 1h30	<a href="#">STM32 MPU tips</a> duration: 1h00
STM32WB workshop				<a href="#">Introduction to STM32Cube.AI</a> duration: 1h30	<a href="#">STM32 boot and startup tips</a> duration: 0h20
TouchGFX how to				<a href="#">Security Part 6 - STM32 security ecosystem, from theory to practice</a> duration: 6h00	
Ultra-low-power STM32 extras with hands-on exercises					
STM32L5 - what really matters with Ultra Low Power					
STM32 boot and startup tips					
STM32Cube.AI workshop					
STM32 security ecosystem					

Feedback

# STM32WB workshop MOOC



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STM32 MOOCs  
(Massive Open  
Online Courses)

Basics of cryptography

External QSPI loader how to

FreeRTOS on STM32 training

Graphics with STM32

Introduction to security

Introduction to STM32Cube.AI

Introduction to STM32L0 family

LPWAN workshop

Motor Control - Part 1

Motor Control - Part 2

Motor Control - Part 3

Motor Control - Part 4

Motor Control - Part 5

Moving from 8 to 32 bits workshop

STM32 drives Spirit2

STM32 Graphics Workshop

## STM32WB workshop MOOC



STM32 goes wireless: BLE IoT for all!

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

Access the course

This MOOC provides basic information about STM32WB MCU line, with its hardware and software tools introduction and multiple hands-on session. Within the course, there is an introduction to BLE theory and its implementation within STM32WB stack.

### What is the STM32WB?

The STM32WB55xx multi-protocol wireless and ultra-low-power devices embed a powerful and ultra-low-power radio compliant with the Bluetooth® Low Energy SIG specification v5.0 and with IEEE 802.15.4-2011. They contain a dedicated Arm® Cortex® -M0+ for performing all the real-time low layer operation.

The STM32WB55xx constitute a family of microcontrollers with different memory sizes, packages and peripherals.

### Who should attend this course?

- Engineers looking for more information about our STM32WB microcontrollers
- Engineers interested in BLE network creation with STM32WB devices
- Engineers looking to design applications using a user-friendly development ecosystem

Feedback



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# STM32WB workshop MOOC



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- Solutions
- Tools & Software
- About ST
- Sample & Buy
- Support & Community
- Login

- STM32WB workshop
- TouchGFX how to
- Ultra-low-power STM32 extras with hands-on exercises
- STM32L5 - what really matters with Ultra Low Power
- STM32 boot and startup tips
- STM32Cube.AI workshop
- STM32 security ecosystem

## Prerequisites

- [P-NUCLEO-WB55](#)
- [128x32 OLED LCD display \("white version"\)](#)
- Four 2.54mm pitch jumpers
- 1x microUSB cable
- PC with Windows 7 (of more recent) operating system with Java JRE v8 (v1.80.0\_191 or newer) with preinstalled [STM32WB\\_workshop\\_package\\_V2.1.exe](#)
- A smartphone (iOS 7+ or Android 5.0+) with Bluetooth v4.x and preinstalled ST BLE Sensor application (v4.1.2 or newer)
- Charger for smartphone (nice to have)

[Access the course](#)

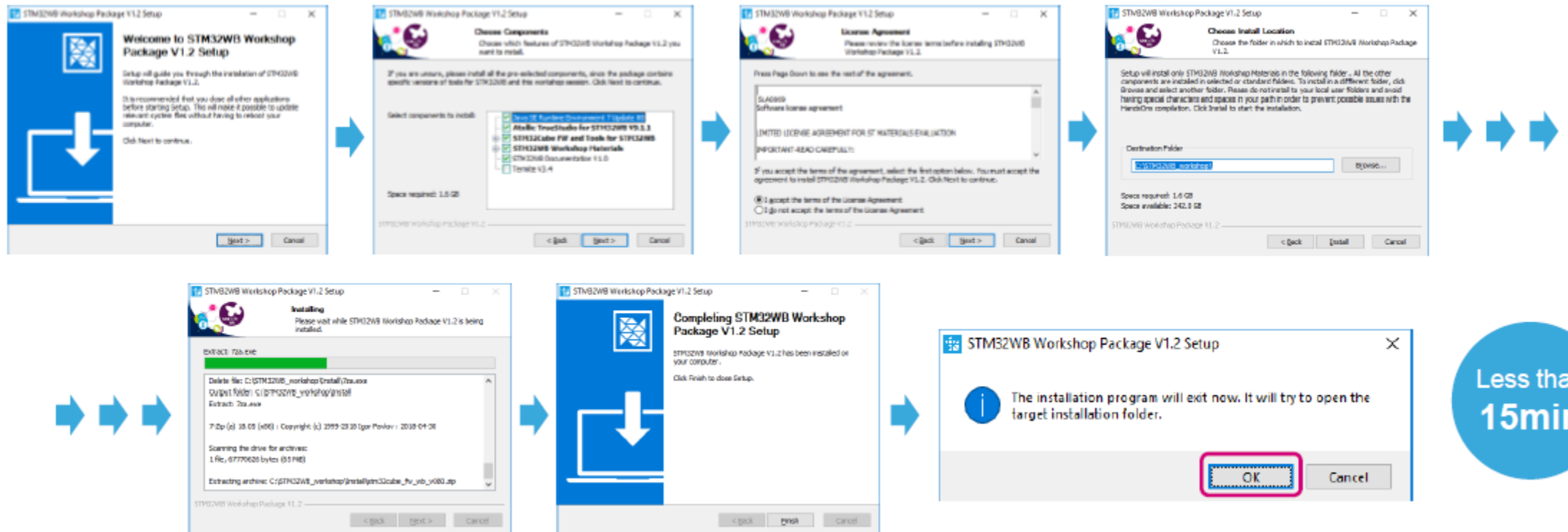
[Feedback](#)



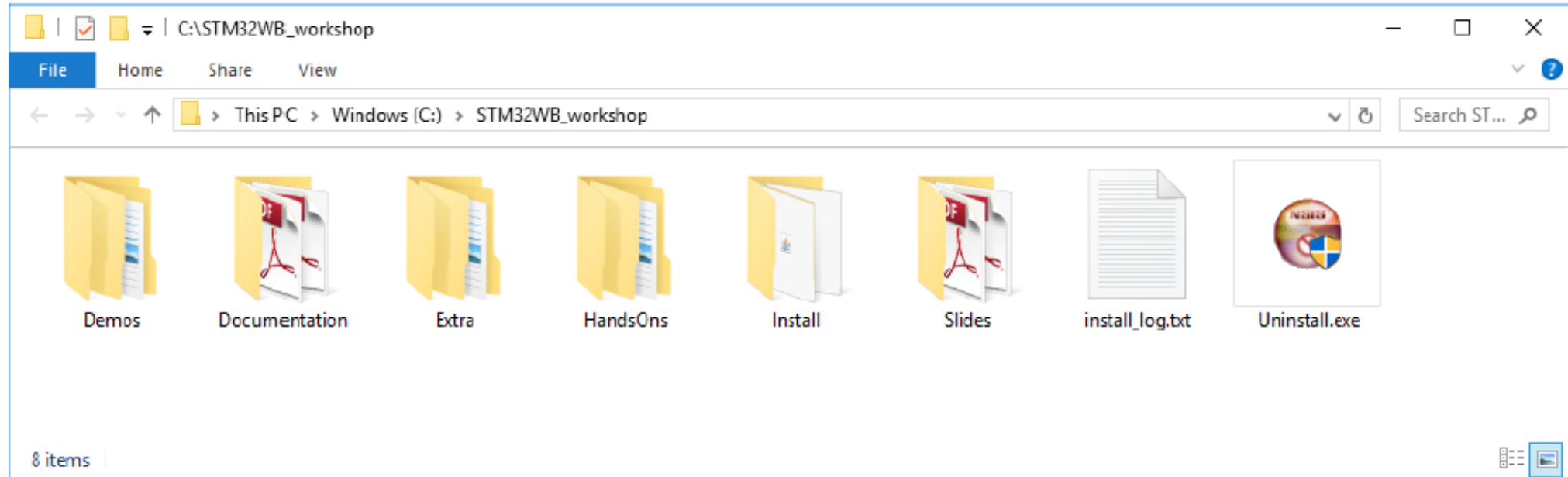
# Prerequisites

- Have run the [STM32WB\\_workshop\\_package\\_V2.1.exe](#) (Package ) to install :
  - Atollic TrueStudio v9.3.0
  - STM32CubeMX V5.1.0
  - STM32CubeWB HAL v1.0.0
  - STM32CubeProg v2.0.0
  - STM32CubeMonitor-RF v2.3.0
  - Documentation related to STM32WB
  - Hands-On projects and files
  - Slides for all chapters (PDF format)
  - Terminate (simple PC terminal app))

# Install the STM32WB Workshop Package














# STM32WB Workshop Materials



Demos	2020-10-06 오후 4:...	File folder	
Documentation	2019-03-21 오후 4:...	File folder	
Extra	2020-10-06 오후 4:...	File folder	
HandsOns	2020-10-06 오후 4:...	File folder	
Install	2020-10-06 오후 4:...	File folder	
Slides	2020-10-06 오후 4:...	File folder	
install_log.txt	2020-10-06 오후 4:...	Text Document	1 KB
Uninstall.exe	2020-10-06 오후 4:...	Application	55 KB

# STM32WB Workshop Slides

<input type="checkbox"/> Name	Date modified	Type	S
 Snippets	2019-03-15 오전 9:...	File folder	
 !ReadMe_V2.1.pdf	2019-03-21 오후 4:...	Adobe Acrobat D...	
 000-STM32WB-WS_How to check setup_Rolling_V...	2019-03-21 오후 4:...	Adobe Acrobat D...	
 00-STM32WB-WS_Introduction_V2.1.pdf	2019-03-21 오후 4:...	Adobe Acrobat D...	
 01-STM32WB-WS_Marketing_presentation_V2.0....	2019-03-21 오후 4:...	Adobe Acrobat D...	
 02-STM32WB-WS_STM32WB_architecture_and_r...	2019-03-21 오후 4:...	Adobe Acrobat D...	
 03-STM32WB-WS_How_to_add_BLE_functionalit...	2019-03-21 오후 4:...	Adobe Acrobat D...	
 04-STM32WB-WS_How_to_modify_the_BLE_profi...	2019-03-21 오후 4:...	Adobe Acrobat D...	
 05-STM32WB-WS_How_to_use_additional_SW_to...	2019-03-21 오후 4:...	Adobe Acrobat D...	
 06-STM32WB-WS_Next_steps_and_demos_V2.1.p...	2019-03-21 오후 4:...	Adobe Acrobat D...	
 07-STM32WB-WS_Ending_V2.1.pdf	2019-03-21 오후 4:...	Adobe Acrobat D...	

# STM32WB workshop MOOC



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- STM32WB workshop
- TouchGFX how to
- Ultra-low-power STM32 extras with hands-on exercises
- STM32L5 - what really matters with Ultra Low Power
- STM32 boot and startup tips
- STM32Cube.AI workshop
- STM32 security ecosystem

## Prerequisites

- [P-NUCLEO-WB55](#)
- [128x32 OLED LCD display \("white version"\)](#)
- Four 2.54mm pitch jumpers
- 1x microUSB cable
- PC with Windows 7 (of more recent) operating system with Java JRE v8 (v1.80.0\_191 or newer) with preinstalled [STM32WB\\_workshop\\_package\\_V2.1.exe](#)
- A smartphone (iOS 7+ or Android 5.0+) with Bluetooth v4.x and preinstalled ST BLE Sensor application (v4.1.2 or newer)
- Charger for smartphone (nice to have)

[Access the course](#)

Feedback



# MOOC - STM32WB workshop

YouTube SG 검색

STM32WB Workshop  
모두 재생

## MOOC - STM32WB workshop

동영상 6개 · 조회수 8,381회 · 최종 업데이트: 2019. 8. 14.

This MOOC provides basic information about STM32WB MCU line, with its hardware and software tools introduction and multiple hands-on session. Within the course, there is an introduction to BLE theory and its implementation within STM32WB stack.

More information about its agenda, prerequisites and link to materials you can find on a dedicated landing page:  
[https://www.st.com/content/st\\_com/en/...](https://www.st.com/content/st_com/en/...)

In case of any questions related to this session, please post then within : <https://community.st.com>

- 1 STM32WB Workshop - 1 Introduction, set up checking and unboxing (22:07) STMicroelectronics
- 2 STM32WB Workshop - 2 STM32WB Architecture (38:22) STMicroelectronics
- 3 STM32WB Workshop - 3 How to add BLE functionality (1:20:30) STMicroelectronics
- 4 STM32WB Workshop - 4 How to modify BLE Profile (52:22) STMicroelectronics
- 5 STM32WB Workshop - 5 STM32WB SW tools and HW tips (48:42) STMicroelectronics
- 6 STM32WB Workshop - 6 Next steps Ecosystem materials, Post MOOC, Demos (13:57) STMicroelectronics

STMicroelectronics 구독중

# STM32WB FUOTA MOOC

## STM32WB Firmware Update Over the Air (FUOTA)



**STM32 goes wireless: BLE IoT for all!**

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

[Access the course](#)

This MOOC demonstrates how to update STM32WB code using different tools and techniques.

# STM32WB FUOTA MOOC

The screenshot shows a YouTube interface. At the top, there is a search bar with the text '검색' and a magnifying glass icon. To the right of the search bar are icons for video, grid, notifications, and a profile picture. On the left side, there is a navigation menu with icons for home, search, trending, subscriptions, and a play button icon labeled '브런치'.

The main video player displays a video titled 'MOOC - STM32WB Firmware Update Over the Air (FUOTA)'. The video thumbnail shows a cityscape at night with a network overlay and the ST logo. Below the video, the text reads: '동영상 7개 · 조회수 2,760회 · 최종 업데이트: 2019. 8. 14.' and '모두 재생'. Below the video player are icons for playlist, full screen, share, and more options.

The video description states: 'This MOOC provides basic information about software update STM32WB MCU line using different tools and techniques, including over the air methods. There are 3 hands on parts within this session to illustrate the content. More information about its agenda, prerequisites and link to materials you can find on a dedicated landing page: [https://www.st.com/content/st\\_com/en/...](https://www.st.com/content/st_com/en/...) In case of any questions related to this session, please post then within : <https://community.st.com>

At the bottom of the video player, there is the STMicroelectronics logo, the channel name 'STMicroelectronics', and a '구독중' (Subscribed) button with a notification bell icon.

On the right side, there is a playlist of 7 videos:

- 1 STM32WB FUOTA - 1 Agenda (1:20)
- 2 STM32WB FUOTA - 2 Marketing update (6:58)
- 3 STM32WB FUOTA - 3 FUOTA principle (9:37)
- 4 STM32WB FUOTA - 4 Lab1 FUS (4:38)
- 5 STM32WB FUOTA - 5 Lab2 FUOTA (4:39)
- 6 STM32WB FUOTA - 6 Lab5 consumption (9:11)
- 7 STM32WB FUOTA - 7 Summary (0:43)

# STM32WB BLE MESH MOOC

## STM32WB Networking – BLE MESH MOOC



**STM32 goes wireless: BLE IoT for all!**

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

[Access the course](#)

This MOOC demonstrates how to build Bluetooth Mesh network with STM32WB using STM32WB55Nucleo pack and its software package.

# STM32WB BLE MESH MOOC

The screenshot shows a YouTube video player interface. The video title is "MOOC - STM32 BLE MESH Introduction". The video description includes the text: "This MOOC demonstrates how to build Bluetooth Mesh network with STM32WB using STM32WB55Nucleo pack and its software package." and "More information about its agenda, prerequisites and link to materials you can find on a dedicated landing page: [https://www.st.com/content/st\\_com/en/...](https://www.st.com/content/st_com/en/...)". Below the description, there is a link to the community page: "In case of any questions related to this session, please post then within : <https://community.st.com>". The video player shows a list of three videos in the series: 1. STM32WB BLE MESH Introduction - 1 Introduction & prerequisites (2:05), 2. STM32WB BLE MESH Introduction - 2 BLE MESH theory (9:16), and 3. STM32WB BLE MESH Introduction - 3 BLE MESH hands-on (9:43). The channel name is STMicroelectronics.

# STM32WB RF Guidelines MOOC

## STM32WB – RF guidelines MOOC



### STM32WB – RF guidelines

Learn how to design your RF circuit within STM32WB based application

[Access the course](#)

Highlighting important knowledge for correct RF design of application. Evaluation of meaning of the individual components in RF chain and simplifying it enough understood for beginners in this specific RF area.

# STM32WB RF Guidelines MOOC

The screenshot shows a YouTube video player interface. At the top, there is a search bar with the text "검색" and a magnifying glass icon. To the right of the search bar are icons for a camera, a grid, a bell, and a profile picture. On the left side, there is a vertical navigation menu with icons for home, a list, a flame (trending), a play button (popular), a video camera (upload), and a play button (subscriptions). The main video player area shows a video thumbnail with the title "STM32WB RF guidelines 1- STM32WB RF overview" and a duration of 36:03. Below the thumbnail, the video title "MOOC - STM32WB RF guidelines" is displayed, along with the text "동영상 3개 · 조회수 410회 · 최종 업데이트: 2020. 5. 19.". Below the title, there are icons for a list, a share icon, a play button, and a three-dot menu. The video description follows, starting with "Learn how to design your RF circuit within STM32WB based application." and "Highlighting important knowledge for correct RF design of application. Evaluation of meaning of the individual components in RF chain and simplifying it enough understood for beginners in this specific RF area." It then provides a link to the material set: [https://www.st.com/content/st\\_com/en/...](https://www.st.com/content/st_com/en/...) and a link to the forum: <https://community.st.com>. At the bottom of the video player, there is a logo for "STMicroelectronics" and a "구독중" (Subscribed) button with a bell icon.

YouTube SG 검색

STM32WB RF guidelines 1- STM32WB RF overview 36:03

1 STM32WB guidelines - 1 - STM32WB RF Overview STMicroelectronics

2 STM32WB RF guidelines - 2 - RF theory and schematics tips 19:30 STMicroelectronics

3 STM32WB RF guidelines - 3 - proper layout design 14:55 STMicroelectronics

MOOC - STM32WB RF guidelines  
동영상 3개 · 조회수 410회 · 최종 업데이트: 2020. 5. 19.

Learn how to design your RF circuit within STM32WB based application.

Highlighting important knowledge for correct RF design of application. Evaluation of meaning of the individual components in RF chain and simplifying it enough understood for beginners in this specific RF area.

More information about the session and complete material set is available here:  
[https://www.st.com/content/st\\_com/en/...](https://www.st.com/content/st_com/en/...)

In case of any questions, feedback, please pass it to our forum at:  
<https://community.st.com>

STMicroelectronics 구독중

# STM32 Online Training (OLT)

- STM32 Online Training
  - STM32G4 Online Training
  - STM32F7 Online Training
  - STM32L4 Online Training
  - STM32L4+ Online Training
  - STM32G0 Online Training
  - STM32WB Online Training
  - STM32H7 Online Training
  - STM32MP1 Online Training
  - STM32L5 Online Training

### STM32 Online Training (OLT)

STM32L5 online training (OLT) STM32MP1 Online Training (OLT) STM32H7 online training (OLT) STM32G4 Online Training (OLT)

STMicroelectronics STMicroelectronics STMicroelectronics STMicroelectronics

모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기

### STM32 Online Training (OLT)

STM32WB Online Training (OLT) STM32F7 online training (OLT) STM32G0 Online training (OLT) STM32L4 Online Training (OLT)






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모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기 모든 재생목록 보기

# STM32 Online Training (OLT)



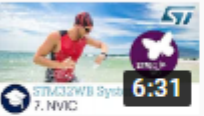


STM32WB Online Training (OLT)  
STMicroelectronics - 1 / 50

◀ ▶ 🔍 ⋮

- ▶  **STM32WB OLT - 1. Introduction Welcome session**  
STMicroelectronics **3:30**
- 2  **STM32WB OLT - 2. Introduction Series Presentation**  
STMicroelectronics **3:14**
- 3  **STM32WB OLT - 3. System ARM Cortex M4**  
STMicroelectronics **1:53**
- 4  **STM32WB OLT - 4. System ARM Cortex M0+ CM0**  
STMicroelectronics **4:58**
-  **STM32WB OLT - 5. System**






STM32WB Online Training (OLT)  
STMicroelectronics - 5 / 50

◀ ▶ 🔍 ⋮

- ▶  **STM32WB OLT - 5. System Interconnect Matrix**  
STMicroelectronics **3:27**
- 6  **STM32WB OLT - 6. System System Configuration Controller**  
STMicroelectronics **11:25**
- 7  **STM32WB OLT - 7. System Nested Vectored Interrupt Control**  
STMicroelectronics **6:31**
- 8  **STM32WB OLT - 8. System Direct Memory Access DMA+DMAMUX**  
STMicroelectronics **13:14**
-  **STM32WB OLT - 9. System Extended**

STM32WB Online Training (OLT)  
STMicroelectronics - 9 / 50

◀ ▶ 🔍 ⋮

- ▶  **STM32WB OLT - 9. System Extended Interrupt Controller**  
STMicroelectronics **7:54**
- 10  **STM32WB OLT - 10. System Debug**  
STMicroelectronics **11:47**
- 11  **STM32WB OLT - 11. System Reset and clock control**  
STMicroelectronics **24:11**
- 12  **STM32WB OLT - 12. System Power control**  
STMicroelectronics **30:46**
-  **STM32WB OLT - 13. System General**



# STM32 Wireless Solutions

## STM32 Wireless Solutions (Short Range, Long Range, Positioning)

STM32WB Bluetooth, Zigbee, Thread, and Security All-in-One 4

STM32WB Video Series Getting Started Part 1 - Overview 14

DEMONS - STM32 Wireless solutions - short range  
STMicroelectronics  
모든 재생목록 보기

STM32 Wireless Solutions - Long Range  
STMicroelectronics  
모든 재생목록 보기

STM32WB Positioning  
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모든 재생목록 보기

STM32WB Getting Started Series  
STMicroelectronics  
업데이트: 5일 전  
모든 재생목록 보기



STM32WB Getting Started Series  
STMicroelectronics - 1 / 13

- 1 STM32WB Getting Started Series: Part 1, Overview 3:09 STMicroelectronics
- 2 STM32WB Getting Started Series: Part 2, Navigating ST.com 8:00 STMicroelectronics
- 3 STM32WB Getting Started Series: Part 3, Tools Install 9:13 STMicroelectronics
- 4 STM32WB Getting Started Series: Part 4, CubeWB 8:41 STMicroelectronics

STM32WB Getting Started Series: Part 5

# STM32WB Getting Started Series

The image shows a YouTube video player interface. At the top, there is a search bar with the Korean text '검색' (Search) and a magnifying glass icon. To the right of the search bar are icons for video, a grid, a bell, and a profile picture. The main video player area displays a video titled 'STM32WB Video Series Getting Started Part 1 - Overview'. The video thumbnail features two STM32WB microchips, one in a QFN package and one in a DIP package, against a blue and yellow background. The video progress bar shows 0:01 / 3:08. Below the video player, the title 'STM32WB Getting Started Series: Part 1, Overview' is displayed. To the right of the video player is a playlist titled 'STM32WB Getting Started Series' by 'STMicroelectronics - 1 / 13'. The playlist contains four items:

- 1. STM32WB Getting Started Series: Part 1, Overview (3:09)
- 2. STM32WB Getting Started Series: Part 2, Navigating ST.com (8:00)
- 3. STM32WB Getting Started Series: Part 3, Tools Install (9:13)
- 4. STM32WB Getting Started Series: Part 4, CubeWB (8:41)

Below the playlist, the title 'STM32WB Getting Started Series: Part 2, Navigating' is partially visible.



life.augmented

# STM32WB Video Series - Getting Started

#6 CubeWB – P2P (Peer to peer)

Minku Yeo

Matching Network

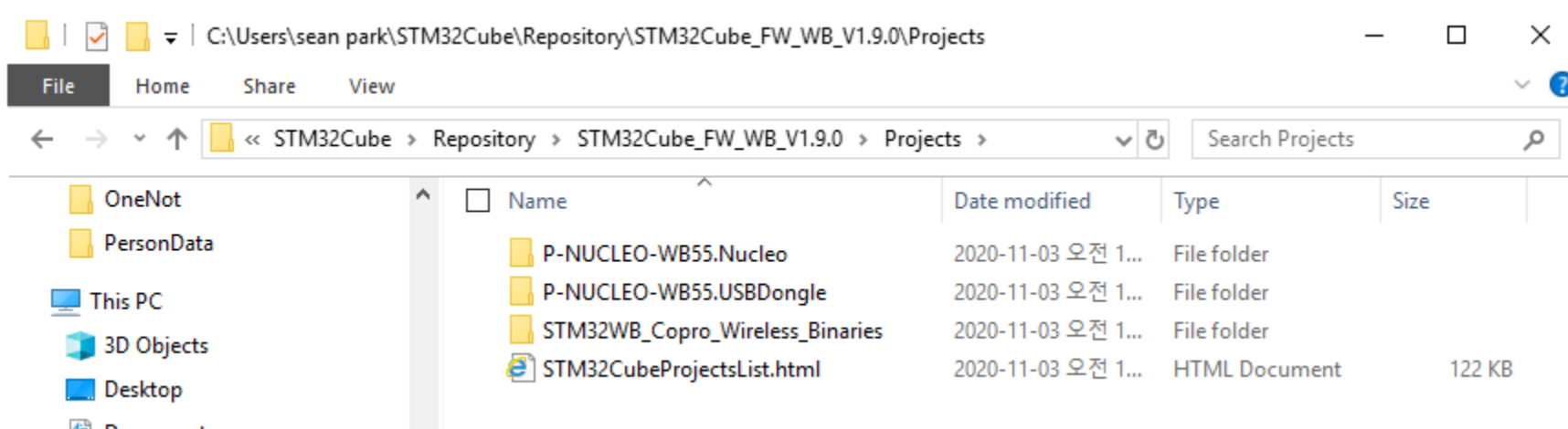
15HS3N6S02  
L3

# STM32WB information collection



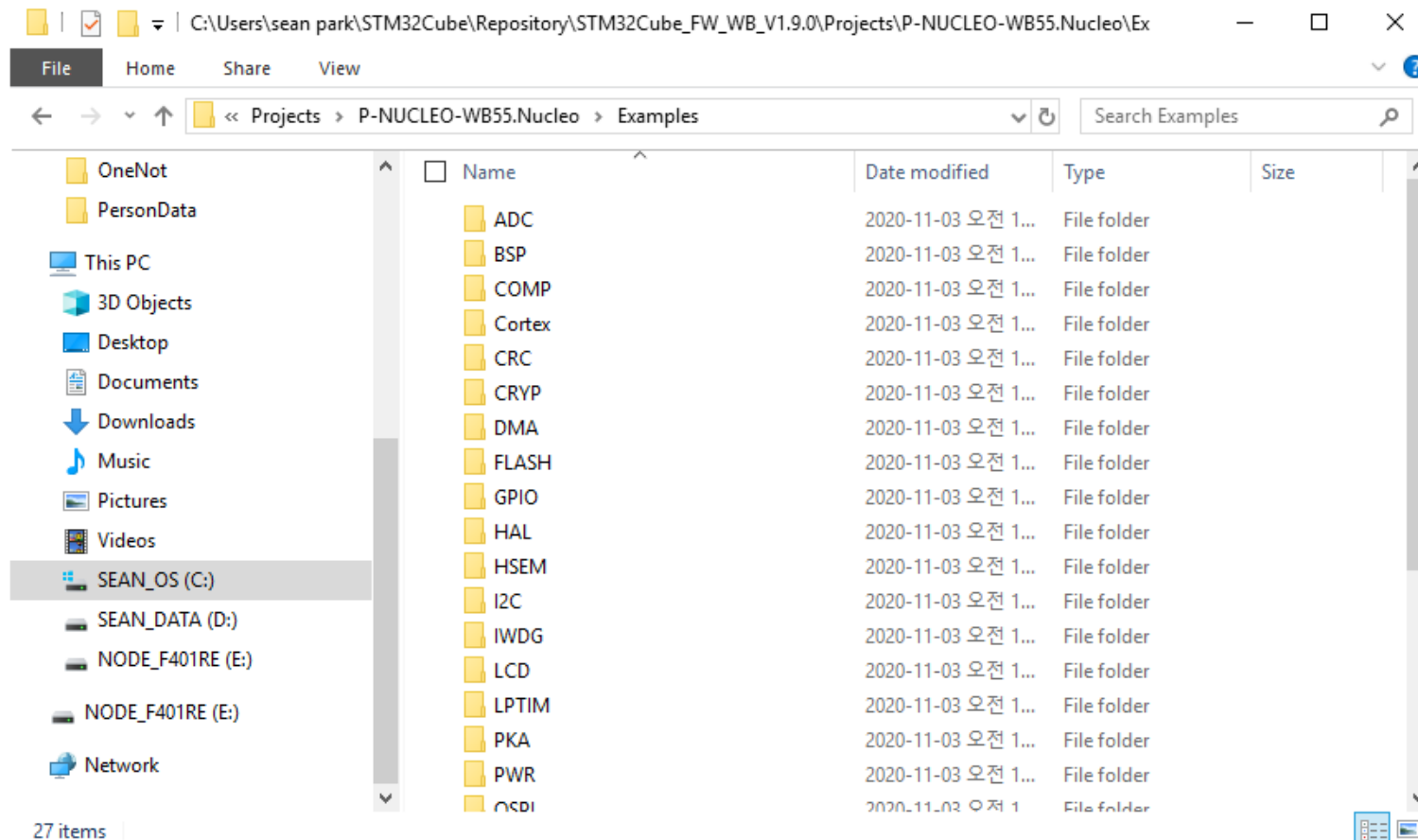
# Where to find the examples

- Firmware package 에 포함된 다양한 예제 위치
  - c:/Users/[User]/STM32Cube/Repository/STM32Cube\_FW\_WB\_Vx.y.z/Projects/[Board\_Name]/Examples



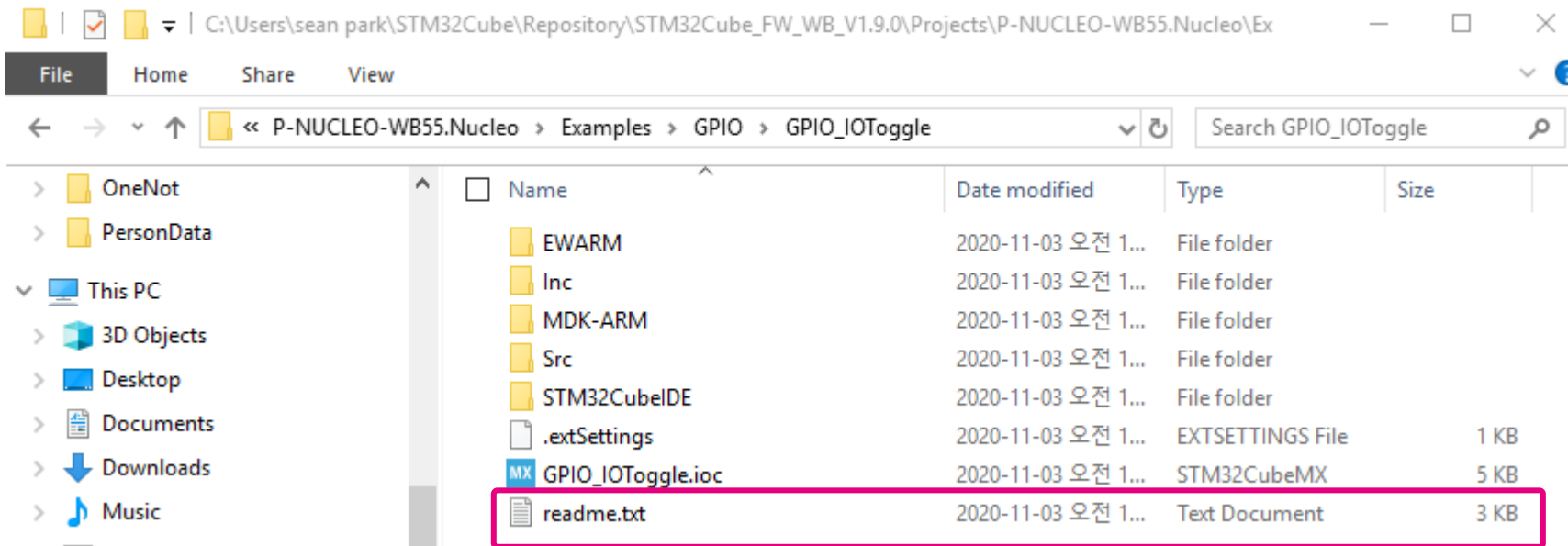
# Where to find the examples

- Firmware package 에 포함된 다양한 예제 위치
  - c:/Users/[User]/STM32Cube/Repository/STM32Cube\_FW\_WB\_Vx.y.z/Projects/[Board\_Name]/Examples





# Where to find the examples

- Example 사용 설명서



# Where to find the examples

- Example 사용 설명서

 GPIO_IOToggle.ioc	2020-11-03 오전 1...	STM32CubeMX	5 KB
 readme.txt	2020-11-03 오전 1...	Text Document	3 KB

```
*****
@endverbatim

@par Example Description

How to configure and use GPIOs through the HAL API.

PB.00 and PB.05 IOs (configured in output pushpull mode) toggle in a forever loop.
On P-NUCLE0-WB55 board these IOs are connected to LED2 and LED1.

In this example, HCLK is configured at 64 MHz.

@note Care must be taken when using HAL_Delay(), this function provides accurate delay (in milliseconds)
based on variable incremented in SysTick ISR. This implies that if HAL_Delay() is called from
a peripheral ISR process, then the SysTick interrupt must have higher priority (numerically lower)
than the peripheral interrupt. Otherwise the caller ISR process will be blocked.
To change the SysTick interrupt priority you have to use HAL_NVIC_SetPriority() function.

@note The example needs to ensure that the SysTick time base is always set to 1 millisecond
to have correct HAL operation.


@par Keywords

System, GPIO, Input, Output, Alternate function, Push-pull, Toggle

@par Directory contents

- GPIO/GPIO_IOToggle/Inc/stm32wbxx_hal_conf.h   HAL configuration file
- GPIO/GPIO_IOToggle/Inc/stm32wbxx_it.h       Interrupt handlers header file
```

# github.com/STMicroelectronics

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## STMicroelectronics

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<https://www.st.com>

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### Pinned repositories

#### [STM32MPU\\_EmbSW\\_Overall\\_Offer](#)

STM32MPU\_EmbSW\_Overall\_Offer

☆ 66 🍴 20

#### [STM32Cube\\_MCU\\_Overall\\_Offer](#)

This repo describes all STM32 MCU related GitHub projects. The open source offer for the STM32 MCU products

☆ 92 🍴 18

#### [STM32MPU\\_EmbSW\\_Android\\_Overall\\_Offer](#)

STM32MPU\_EmbSW\_Android\_Overall\_Offer

☆ 7 🍴 1

#### [STMems\\_Overall\\_Offer](#)

STMicroelectronics offers a full set of drivers and configuration examples for using MEMS sensors with different operating systems. This repository describes all open source GitHub projects related...

☆ 16 🍴 5

# github.com/STMicroelectronics

## STM32CubeF4

STM32Cube MCU Full Package for the STM32F4 series - (HAL + LL Drivers, CMSIS Core, CMSIS Device, MW libraries plus a set of Projects running on all boards provided by ST (Nucleo, Evaluation and Discovery Kits))

[stm32cube-mcu-package](#)

● C 🍴 76 ☆ 173 ⓘ 15 🛠️ 5 Updated 10 days ago

## stm32f1xx\_hal\_driver

Provides the STM32Cube MCU Component "hal\_driver" of the STM32F1 series.

[hal-driver](#) [stm32cube-mcu-component](#)

● C 🍴 6 ☆ 3 ⓘ 0 🛠️ 1 Updated 10 days ago

## STM32CubeF1

STM32Cube MCU Full Package for the STM32F1 series - (HAL + LL Drivers, CMSIS Core, CMSIS Device, MW libraries plus a set of Projects running on all boards provided by ST (Nucleo, Evaluation and Discovery Kits))

[stm32cube-mcu-package](#)

● C 🍴 54 ☆ 132 ⓘ 3 🛠️ 1 Updated 10 days ago

## stm32f2xx\_hal\_driver

Provides the STM32Cube MCU Component "hal\_driver" of the STM32F2 series.

[hal-driver](#) [stm32cube-mcu-component](#)

● C 🍴 1 ☆ 1 ⓘ 1 🛠️ 0 Updated 10 days ago

## STM32CubeF2

STM32Cube MCU Full Package for the STM32F2 series - (HAL + LL Drivers, CMSIS Core, CMSIS Device, MW libraries plus a set of Projects running on all boards provided by ST (Nucleo, Evaluation and Discovery Kits))

[stm32cube-mcu-package](#)

● C 🍴 5 ☆ 12 ⓘ 0 🛠️ 0 Updated 10 days ago

### Top languages

● C ● C++ ● Java ● Shell  
● Python

### Most used topics

[stm32cube-mcu-component](#)  
[cmsis-device](#) [hal-driver](#)  
[stm32cube-mcu-package](#) [stm32](#)

### People

1 >



# <https://github.com/STMicroelectronics/STM32CubeWB>

The screenshot shows the GitHub repository page for STM32CubeWB. At the top, there is a navigation bar with links for Why GitHub?, Team, Enterprise, Explore, Marketplace, and Pricing. A search bar and 'Sign in' / 'Sign up' buttons are also present. Below the navigation bar, the repository name 'STMicroelectronics / STM32CubeWB' is displayed, along with statistics: 28 Watchers, 50 Stars, and 31 Forks. A secondary navigation bar includes links for Code, Issues (10), Pull requests, Actions, Projects, Security, and Insights. A large banner for 'Join GitHub today' is visible, with a 'Sign up' button. Below the banner, the repository's current state is shown: 'master' branch, 1 branch, and 10 tags. A 'Go to file' button and a 'Code' button are also present. The main content area displays a list of files and folders, including .github, Documentation, Drivers, Middlewares, Projects, Utilities, and \_htmresc, along with their respective release versions and commit dates. On the right side, there is an 'About' section with a description of the package and links for 'stm32cube-mcu-package', 'Readme', and 'View license'. A 'Releases' section is also visible at the bottom right, showing 10 tags.

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master 1 branch 10 tags Go to file Code

File/Folder	Commit Message	Commit Date
ALABSTM Release v1.9.0	e3d0473 on Oct 3 12 commits	
.github	Update CONTRIBUTING.md and PULL_REQUEST_TEMPLATE...	8 months ago
Documentation	Release v1.6.0	7 months ago
Drivers	Release v1.8.0	3 months ago
Middlewares	Release v1.9.0	last month
Projects	Release v1.9.0	last month
Utilities	Release v1.8.0	3 months ago
_htmresc	Release v1.3.0	13 months ago
CODE_OF_CONDUCT.md	Release v1.1.0	2 years ago
CONTRIBUTING.md	Update CONTRIBUTING.md and PULL_REQUEST_TEMPLATE...	8 months ago
License.md	Release v1.3.0	13 months ago

About  
Full Firmware Package for the STM32WB series: HAL+LL drivers, CMSIS, BSP, MW, plus a set of Projects (examples and demos) running on all boards provided by ST (Nucleo, Evaluation and Discovery Kits).  
stm32cube-mcu-package  
Readme  
View license

Releases  
10 tags

# STM32 Question



# ST Community!

The screenshot displays the ST website interface. At the top left is the ST logo with the tagline 'life.augmented'. To its right is a navigation bar containing a 'Products' dropdown, a search bar with the placeholder 'Search...', and a blue 'Search' button. Further right are links for 'Contact Us' (with a shopping cart icon) and 'English' (with a dropdown arrow). Below this is a dark blue navigation bar with icons and text for 'Products', 'Applications', 'Solutions', 'Tools & Software', 'About ST', 'Sample & Buy', and 'Support & Community'. A 'Login' link with a user icon is also present. The 'Support & Community' dropdown menu is open, listing 'Support Home', 'Contact ST', 'Partner Program', 'Learning Home', and 'Video Center'. The 'ST Community' link is highlighted with a pink rectangular border. The main content area features a large teal banner with the text 'Acoustic vehicle alerting systems help protect pedestrians' and an 'AutoDevKit' icon. Below the banner is a 'Learn more' button with a right-pointing arrow. The background of the banner shows a woman in a red coat walking past a blurred car.

# ST Community!

The screenshot shows the ST Community website. At the top left is the ST logo. A search bar contains the text "Enter relevant keywords and click the Search button..." with a "Search" button to its right. A "Login" link is in the top right corner. A navigation menu includes "Home", "Q&A", "Communities", "Share Your Activities", "Idea Zone", "Articles", and "About". The "Communities" dropdown menu is open, listing various categories: STM32 MCUs (highlighted with a pink box), STM32 MPUs, MEMS and Sensors, Interface and Connectivity ICs, STM8 MCUs, Power Management and Motor Control, SPC5 Automotive MCUs, Analog and Audio, ST25 NFC/RFID Tags and Readers, IOTA, eDesignSuite, EMI Filtering and Signal Conditioning, EEPROM, Legacy MCUs, ST PowerStudio, Switches and Multiplexers, Discontinued Products, and More Topics... Below the navigation is a "Welcome to the ST Community!" header. Two large blue boxes contain the text "Discuss with peers and experts in Communities" and "Share tell us about your work Share Your Activities". Below these is a section titled "Activity across the community" with a search bar and a refresh icon. At the bottom right, there is a banner for the "ST Developers Conference 2020 Virtual Event, 20-21 Oct!" with a registration link.

# ST Community!

DISCUSSIONS ARTICLES

Questions 57607

Sort by  
Most Recent Activity

All Questions

## Setting up UART 1 on B-L475E-IOT01a using bare metal (Newbie)

STM32 Education · Posted by B.Redmoon

Oct 26, 2020, 10:12 Last activity: Oct 26, 2020, 10:12

0 0

## STM32H750 use 8080 to drive the 5-inch LCD (800x480) and only use the MCU's internal SRAM

TouchGFX · Posted by lwx

Oct 19, 2020, 19:15 Last activity: Oct 26, 2020, 10:07

0 3

## UART CONNECTIONS ON STM32H7B3I-DK

STM32 MCUs · Posted by DRAME.1

Oct 25, 2020, 09:32 Last activity: Oct 26, 2020, 09:59

0 3

Hello , i want to use QSPI MEMORY(MT25Q128) with STM32L476RE MCU Later, I tried to storage data to above FLASH in Single-SPI MODE(EXTENDED SPI) and That's work is good BUT I hope to storage data USING QUAD-SPI MODE so, tried to below steps

STM32 MCUs · Posted by Wjung.1

Oct 26, 2020, 09:40 Last activity: Oct 26, 2020, 09:40

0 0

## How to send data from a P-Nucleo-WB55 board to a custom made android app?

STM32WB · Posted by CFragment

Oct 26, 2020, 09:06 Last activity: Oct 26, 2020, 09:06

0 0

## RM0440, Rev 4, STM32G4 Reference Manual - Section 27.5.66 / 27.5.67 - Error in bit description

Documentation · Posted by Singh.Harjit

Oct 26, 2020, 09:04 Last activity: Oct 26, 2020, 09:04

0 0

## How to transfer SPI camera image to a mobile device with using STM32WB BLE?

STM32WB · Posted by y.arikok

Aug 04, 2020, 23:56 Last activity: Oct 26, 2020, 08:47

0 3

Ask a Question

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### Knowledgeable People



clive1 (NFA Crew)



waclawek.jan



TDK



Imen DAHMEN



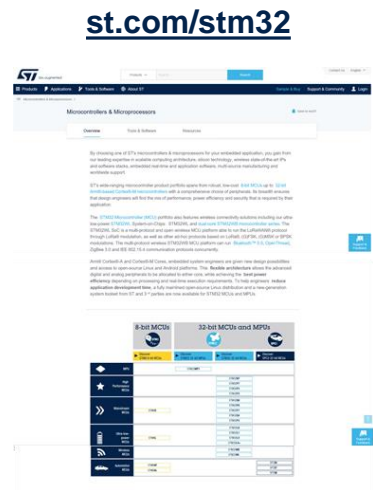
berendi

### Helpful Tips

1. Click the Follow button above to add this Q&A Topic to your personal feed.
2. Use the filter buttons at left and right to refine your view

# Information and Sharing

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-  [linkedin.com/stmicroelectronics](https://linkedin.com/stmicroelectronics)
-  [21ic](https://21ic.com)
-  [优酷 YouKu](https://youku.com)

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Community/GitHub

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# QnA



# Thank you

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